

Biochemistry of Volatile Compounds Synthesis in *Agaricus bisporus*

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Agaricus bisporus unique flavour is due to the release of a set of eight-carbon volatile compounds, which biosynthetic pathway has not been elucidated yet, despite of the numerous implications of those volatile compounds. Beside their influence on crop quality, they are also important for insect perception and play a part in triggering the switch from vegetative to reproductive growth in mushrooms.

8-carbon volatiles are derived from the oxygenation and the cleavage of the polyunsaturated fatty acid linoleic acid. This reaction has similarities to the plant system, but also major differences. Examination of the enzymic mechanisms and the fatty acid chemistry suggested that the enzyme involved in the oxygenation step could be a lipoxygenase (as found in plants) or a heme-dioxygenase, similar to the recently isolated linoleate diol synthase from *Gaeumannomyces graminis*.

In order to characterise the biochemical pathway leading to eight-carbon volatile production, we investigated fatty acid and lipids distribution in *Agaricus bisporus*, as well as hydroperoxide and volatile compounds levels. In parallel, we searched for candidate genes susceptible to encode the enzyme responsible for this novel oxidation route in fungi.

The combination of analytical methods, such as GC-MS, with a molecular approach based on degenerate PCR and library screening provided us with a broad range of results. These results establish the relation between fatty acids and volatile compounds and enabled us to gain a better understanding of mushroom volatiles biosynthesis and lipid metabolism.